

Prof. Heinrich Helmholtz, of the University at Berlin.  
 Prof. Theodor Mommsen.  
 Mr. Theodore D. Rand, of Philadelphia.  
 Prof. Joseph LeConte, of California.  
 Prof. John LeConte, of California.  
 Mr. John Fulton, of Saxton, Huntingdon, Co., Pa.  
 Mr. Lloyd P. Smith, of Philadelphia.  
 Prof. Geo. F. Barker, of the University of Pennsylvania,  
 in West Philadelphia.  
 And the meeting was adjourned.

## ON THE OSTEOLOGY OF THE EXTINCT TAPIROID HYRACHYUS.

BY PROF. E. D. COPE, A. M.

(Read before the American Philosophical Society, April 18, 1873.)

This genus was originally described by Leidy\* from portions of skeletons of individuals from the Eocene tertiary of Wyoming. He recognized it as related to the *Lophiodon* of Cuvier in dentition, and as sharing with characters of that Eocene genus, peculiarities which belong to the existing genus *Tapirus*.

Having obtained a large series of remains of this genus, including more or less numerous portions of six species with nearly complete skeleton of *H. eximius*, Leidy, I propose to give such an account of its osteology as will place its relations on a certain basis.

The characters which distinguish its dentition from those of the allied genera are as follows:

*Tapirus*, Briss. *Lower jaw*: third molar two-crested; three premolars, the third and fourth with two transverse crests. *Upper jaw*: seven molars, first with an inner heel tubercle; other premolars with two transverse crests.

*Hyrachyus*, Leidy. *Lower jaw*: third molar with two crests; four premolars, third and fourth with one transverse and one longitudinal crest. *Upper jaw*: seven molars, first without interior heel; premolars with two transverse crests.

*Lophiodon*, Cuvier. *Lower jaw*: third molar with three cross-crests; premolars three, Nos. 2 and 3 with longitudinal crests. *Upper jaw*: premolars with longitudinal crest only; No. 4 with two transverse crests. *Upper jaw*: premolars with only one transverse crest.

In *Hyrachyus* the nasal bones are elongate, and unite with the maxillaries anterior to the orbit; in *H. eximius* above the foramen infra-orbitale exterius; in *Tapirus* those bones are much shortened, and either do not

\* Hayden's U. S. Geological Survey of Montana, 1871, p. 361.

unite with the maxillaries or join them and the frontals above the orbit at different points from the anterior to the posterior borders. The temporal fossæ are so extended as to produce an elevated sagittal crest, which is bifurcate behind, each projection continuing along the outer margin of the occipital region as a lateral crest. The tympanic bone is unossified beneath the *meatus auditorius externus*, which is bounded in front by a strong postglenoid process. Posteriorly it is bounded by a long descending mastoid process of the squamosal bone, nearly closing it below. This is bounded posteriorly by a long and stout paramastoid process, which is compressed from before backwards and curves backwards and inwards. The foramen magnum has prominent supero-lateral margins which are nearly straight, and unite at a right angle above.

The dentition is thus : I.  $\frac{3}{3}$  ; C.  $\frac{1}{1}$  ; P.M.  $\frac{4}{4}$  M.  $\frac{3}{3}$  ; a considerable diastema separates the premolars and the canine.

In the species studied, the vertebræ are divided as follows : C. 7 ; D. 18 ; L. 7 ; S. 5 ; C. 2 ; Of the cervicals the seventh only is not pierced by the arterial canal. The atlas has a broad flat "transverse" process.

The digits are 4—3 ; the third with a symmetrical hoof, those of the exterior digits halved ; the former have two reverted proximal processes, the latter, one. The astragalus exhibits a deeply-grooved and extensive trochlear arc, with rather long neck, which has a greater facet for the astragalus, a lesser for the cuboid bone.

From the above it is evident that this genus is nearly allied to *Tapirus* and cannot be removed to another family. Professor Leidy states that the premolars differ from those of *Tapirus* in having "but one inner lobe connected with the external crest by two transverse crests." The appearance of one lobe is produced by the posterior curvature of the anterior transverse crest round the inner extremity of the posterior crest.

I now proceed to describe the skeleton more exactly.

#### HYRACHYUS EXIMIUS. Leidy.

Hayden's Geol. Survey, Montana, 1871, p. 361.

*Cranium.* In the specimen to be described, the anterior portion from the glenoid cavities is wanting. The sagittal crest is quite elevated, and the lateral occipital quite prominent, and continuous below with the superior margin of the squamosal portion of the zygoma. Four nutritious foramina pierce the parietal bone near its middle and above the paramastoid process, and two enter the squamosal above the postglenoid process. The paramastoid process approaches near the occipital condyle by its posterior border. I cannot discover the sutural boundaries of the mastoid bone, but that separating the paramastoid process from the process in front of it is distinct. The condyle of the mandible is massive and the posterior border of the latter extends backwards with a slight obliquity.

<i>Measurements.</i>	<i>M.</i>
Elevation of sagittal crest above foramen magnum.....	.045
Width of bifurcation of crest behind.....	.038
“ occiput behind meatus auditorius.....	.070
Width between, inclusive of occipital condyles.....	.046
“ temporal fossa at meatus.....	.050
“ meatus auditorius.....	.012
“ condyle of mandible.....	.032
Depth of ramus behind.....	.095

In further illustration of the species I add measurements of teeth, etc. from another specimen :

Length of last two superior molars.....	.041
“ last molar.....	.019
Width of last “ .....	.022
Length of inferior molar series.....	.095
“ “ premolars.....	.040
“ “ last molar.....	.021
Width “ “ .....	.013
Depth ramus at first true molar.....	.040

*Vertebrae.* The atlas is deeply incised anteriorly above. It is rather short and its transverse processes are flat, thin, about as long as broad and with regular convex distal margin. The arterial foramen issues some distance above and within the notch which marks the anterior base of the transverse process. It enters at the notch at the posterior base. The neural arch is quite convex and its anterior margin is obtusely rounded. The axis is near the same length and bears a prominent and elongate laminate neural spine. Its diapapophysis is narrow and overlaps the parapophysis behind it three-quarters of an inch; it is pierced for the cervical artery. The centra of the third and fourth cervicals are about equal in length to that of the axis, but the remaining ones shorten successively to the seventh which maintains a length somewhat greater than its width. The parapophyses of these, except the seventh, are flattened and have considerable antero-posterior extent, their extremities overlapping. A short and rather narrow and stout diapophysis is present on the sixth cervical; on the seventh it is larger, especially expanded antero-posteriorly at the base, and truncate. There is no parapophysis. The fourth, fifth, sixth and seventh have strongly opisthocœlian centra; that of the third is injured.

<i>Measurements.</i>	<i>M.</i>
Length of the cervical series.....	0.175
“ atlas, between articular faces.....	.046
“ base transverse process.....	.035
“ of “ “ .....	.020
Diameter neural canal in front.....	.021
“ of anterior expanse.....	.050
“ “ total “ .....	.099

<i>Measurements.</i>	<i>M.</i>
Length axis along basis neural arch.....	.021
Elevation crest (rectangular) from posterior zygapophysis.....	.036
Length parapophysis of fifth cervical on margin.....	.051
Extent zygapophyses " " " " .....	.048
Expanse " " " " behind.....	.044
Elevation neural spine of C. 6.....	.056
" " " C. 7.....	.075
Length centrum below " " .....	.028
Diameter of cup, about.....	.032

The measurements indicate that the neural spines of the sixth and seventh are quite elevated, the latter nearly equal to that of the first dorsal.

The spines of the dorsal vertebræ are elevated in the front of the series rising some distance above the scapulæ. They shorten and widen rapidly from the middle of the series backwards. The extremities of all from the scapula posteriorly are turned forwards. The metapophyses are conspicuously elevated above the diapophysis on the eleventh dorsal, and on the eighteenth, their elevation is about .4 that of the neural spine. The diapophysis is extended beyond the tubercular articulation, on the 18th dorsal; the extension and expansion increases rapidly on the lumbar. On the fourth they are as wide at the base as .66 the length of the centrum and maintain their width, being directed anteriorly. On the sixth and seventh they are still wider and longer, and very thin. They present a projecting transverse surface backwards one-fourth the length from the base for articulation with the seventh lumbar and first sacral respectively. The centra of the lumbar are depressed and slightly opisthocelican, except the last, which is flat. They are contracted and keeled below.

The sacrum is long and narrow, and thoroughly coössified in the specimen. The diapophysis of the first and part of that of the second gives attachment to the ilium. The intervertebral foramina are rather small.

<i>Measurements.</i>	<i>M.</i>
Length of dorsal vertebræ along middles of neural spines.....	.420
" of lumbar do. ....	.298
" of sacrum along centra.....	.170
Diameter centrum first dorsal (transverse).....	.019
" " " (vertical).....	.019
" " fifth lumbar " .....	.020
" " " (transverse).....	.0325
Length do. ....	.039
" diapophysis sixth do. ....	.065
Greatest transverse width of diapophysis sixth lumbar.....	.039
Length centrum seventh lumbar.....	.034

	Measurements.	M.
Transverse diameter centrum first sacral.....		.036
“        expanse diapophyses do. ....		.086
“        diameter end of last sacral.....		.020
“        “        diapophyses do. ....		.043
Elevation neural spine second dorsal.....		.095
“        “        seventh “        above scapula....		.035
“        “        eighteenth “        (from arch behind)		.037

The *ribs* are long and slender, the first but little expanded distally and united with the *manubrium sterni* a little behind its middle. They number eighteen, but as the last is quite long, there may have been another pair of shorter ones not yet exposed in the matrix.

	Measurements.	M.
Length first.....		0.118
Width first, distally.....		.018
Length eighteenth.....	} from tubercle. {	.180
“        sixteenth (end broken). }		.223

There are four *sternal segments* preserved, with a fragment of another. They are distinct, and the first is the largest. It is a longitudinal plate, placed on edge, with the anterior border strongly excavated. The inferior margins of the succeeding segments are thickened, but the compressed form remains, the section being triangular.

The *scapula* is large for the size of the animal. It has an approximately triangular form, the base being superior. The posterior angle is right, but the anterior regularly rounded. The apex supports the glenoid cavity on a neck which is contracted by a shallow excavation of the anterior margin. The latter is bounded next the glenoid cavity by the short obtuse coracoid, which stands a short distance above the articulation. The spine is long, rather elevated, with a regular convex border curved backwards.

	Measurements.	M.
Length of three sternal segments.....		0.147
“        first        “        “        .....		.084
Depth of        “        “        “        in front.....		.044
Width of        “        “        “        below .....		.004
“        third        “        “        .....		.015
Length of scapula (median).....		.215
Width above (greatest).....		.130
“        of neck.....		.036
“        of glenoid cavity.....		.035

*Humerus.* The head is directed a little inside of directly backwards. The bicipital groove is very deep and the inner tuberosity large and directed forwards. The external tuberosity is much larger, as usual in this group of ungulates, and rises in a hook-like apex above the level of the head. The external bicipital ridge is lateral, and not very prominent,

extending on one-third the length of the shaft. The shaft is moderately compressed at the middle, but transversely flattened below. It is nearly straight. The condyles are narrow, and the inner and outer tuberosities almost wanting; their position marked by shallow concavities. The external continues in a lateral crest which turns into the shaft below the lower third. The inner condyle is both the widest and most prominent; the external has its carina at its middle, and its external trochlear face oblique and narrow; narrowest behind. The olecranon and coronoid fossæ are deep and produce a small supra-condylar foramen.

The *ulna* exhibits a large and obtuse olecranon, concave on the external face. Its glenoid cavity is narrowed and elevated behind; in front it widens, and there the ulna receives the transverse proximal end of the radius, which overhangs it on both sides, leaving the little elevations of the right and left coronoid processes about equal. The vertical diameters of the shaft of the ulna are about equal throughout. Its section is triangular, the base being next the radius for the proximal third. This is followed by an edge next the ulna, and the base of the section is on the outer inferior aspect, an account of the direction of an angle from a short distance beyond the outer coronoid process to the base of the ulnar epiphysis, where it disappears. Distally there are two other very obtuse ridges above this one. The extremity bears two facets, the larger for the cuneiform, the smaller for the pisiform bone.

The *radius* is throughout its length a stouter bone than the ulna and bears much the greater part of the carpal articulation, viz.: with the scaphoid, lunar and part of the cuneiform bones. This articulation is transverse to that of the ulna, which is thus at one side of and behind it. The head is a transverse oval in section, the narrower end outwards. The articular face consists of one-and-a-half trochleæ, the latter wider and internal. The shaft is a transverse oval in section, with an angular ridge along the middle externally, and the distal part proximally. A broad groove marks the upper face of the epiphysis, where the shaft has a vertical inner face.

#### Measurements.

	M.
Length humerus (axial).....	0.270
Diameter head to bicipital groove.....	.037
Length along crest outer tuberosity (about).....	.052
Transverse diameter, distally.....	.046
Antero-posterior do. inner condyle.....	.042
Width olecranon fossa.....	.020
Length ulna.....	.260
Depth olecranon, distally.....	.027
“ at coronoid process.....	.025
“ of distal end.....	.019
“ at middle shaft.....	.019
Length radius.....	.200
Width of head.....	.036



Depth of head.....	.021
Width shaft at middle.....	.021
"    near distal end (greatest).....	.037
"    distal articulation.....	.030

The elements of the *carpus* are distinguished for length, and for reduction of width. The anterior faces of all are considerably longer than broad, but the longest faces of the cuneiform, scaphoid, and trapezoides are antero-posterior. The facets are as usual in the carpus; scaphoid  $\frac{1}{3}$ ; lunar  $\frac{1}{2}$ ; cuneiform  $\frac{3}{4}$ ; trapezium  $\frac{1}{2}$ ; trapezoides  $\frac{1}{2}$ ; magnum  $\frac{2}{3}$ ; unciform  $\frac{2}{3}$ . The cuneiform has a rather L-shaped external face. The pisiform has two proximal facets and is enlarged and thickened distally; pressed inwards it reaches the scaphoid. The trapezium is a small subdiscoid bone with convex outer face. The magnum is as broad as deep in front, where its surface is swollen; it is produced behind into a spatulate decurved hook. The unciform has a narrow sub-acute hook behind, with wide base.

<i>Measurements.</i>		M.
Width of carpals of first row together.....		.044
"    of lunare, outer face.....		.016
Depth    "    "    .....		.020
"    cuneiform    "    .....		.020
Width    "    "    .....		.020
Length pisiform    "    .....		.030
Depth distally    "    .....		.014
Width three carpals of second row.....		.038
"    magnum outer face.....		.015
Depth    "    "    .....		.014
"    unciform    "    .....		.017
Width    "    "    .....		.020
Length    "    antero-posterior.....		.021
"    magnum    "    .....		.029
Total length of carpals.....		.040

The *metacarpals* are quite slender. The first only is wanting; the third is rather stouter than the others, while the fourth is considerably the most slender. Its distal extremity is oblique with prominent median keel, which is wanting on the superior aspect. The proximal facets of these bones are respectively (2d) 2, (3d) 2, (4th) 1, (5th) 1. There is a short shallow groove near the proximal front of No. 3. The phalanges corresponding are lost in the specimen.

<i>Measurements.</i>		M.
Length of fifth metacarpal.....		.0070
Estimated length of foot.....		.187
Distal diameter of 5th metacarpal.....		.012
Proximal    "    "    .....		.007
"    "    4th    "    .....		.012
"    "    3d    "    .....		.017
"    "    2d    "    .....		.012

The above are taken on the articular faces transversely.

The *pelvis* is perfectly preserved. The ischium is but little over half as long as the ilium measuring from the middle of the acetabulum. The ilium is a triradiate bone, the superior or sacral plate rather shorter and wider than that forming the "crest," which is subsimilar to the peduncular portion. The crest expands very slightly distally forwards and downwards. The ischio-pubic suture is a long one, and the obturator foramen a long oval; the inferior pelvic elements do not form a transverse, but meet at an open angle.

<i>Measurements.</i>	<i>M.</i>
Length ilium to sacral border.....	0.130
"      "      " crest.....	.180
"      crest.....	.060
Width peduncle.....	.030
Length ischium from middle of acetabulum.....	.110
Width do. posteriorly.....	.080
Length obturator foramen.....	.041
Width      "      ".....	.034
Expanse of ischia above at middle.....	.076

*Femur.* The head projects inwards on a well-marked neck. The great trochanter is strongly recurved and presents an anterior tuberosity as well. It rises to an incurved apex much elevated above the head. The prominence of the front of the femur is continued into the front of the trochanter. The outer margin of the shaft is thin, and at a point two-fifths the length from the proximal end is produced into a low thin trochanter, which is curved forwards and thickened on the margin. The trochlea is well elevated, the inner margin a little the most so, and is narrow. It is continuous with the surface of the inner condyle, which is the shorter and more vertical; the external is longer and divergent; its terminal face is marked by two fossæ, one in front of the other just outside the distal end of the ridge bordering the trochlea. Little trochanter moderate.

<i>Measurements.</i>	<i>M.</i>
Total length.....	0.285
Proximal width of head and trochanter.....	.075
Width from front to edge third trochanter.....	.050
"      just above condyles.....	.035
"      of condyles.....	.058
Chord of outer condyle and trochlea.....	.060

The *tibia* has a broad prominent crest, which is remarkable in being deeply fissured longitudinally at its superior portion. The tendinous notch separates the outer portion of the crest from the spreading margin of the outer cotyloid face. The crest disappears at the proximal third, and the shaft becomes flattened in front and on the inner side. The dis-



tal articular extremity is impressed by  $1\frac{2}{3}$  trochleæ, the outer being completed by the fibula. The posterior tuberosity is more nearly median than usual, hence the inner margin of the inner trochlea is low posteriorly, and the inner malleolus has a considerable beveled inferior margin. The *fibula* has a slender shaft, but little compressed. The head is expanded fore and aft, and the malleolus is quite stout.

*Measurements.*

M.

Length of tibia.....	0.244
Diameter from outer angle of head to inner angle of crest.....	.065
Diameter distal end (greatest).....	.035
Diameter articular face, transverse.....	.027
“    “    “    fore and aft.....	.026

Both *hind feet* are perfectly preserved. The calcaneum is rather elongate and compressed, the lower face truncate with two longitudinal bounding ridges, the outer of which is discontinued before reaching the heel. The surface between them is striate grooved. The outer face is slightly concave. The astragaline facets are much expanded inwards; the outer is transverse and strongly convex, and separated by a groove from the inner, which is longitudinal and nearly plane. The posterior edge of this, and convexity of the outer facets are received into a transverse groove of the posterior part of the lower face of the astragalus. The cuboid facet is diagonal and is bounded within by a third narrow facet for the astragalus. The astragalus has a strongly convex deeply grooved trochlea; the convexity extends over  $158^\circ$ . The trochlea is nearly in the vertical, a little oblique to the longitudinal axis of the foot. The exterior malleolar facet is well marked and bounds a lateral fossa above. The neck of the astragalus is broad and not contracted, but not wider than the trochlea. Its navicular facet is wide and concave, the cuboid narrow, with a long angle behind. The cuboid is quite elongate and with a narrow anterior face; it has a large posterior tuberosity not projecting much posteriorly. The navicular is flat with a sigmoid proximal face, convex on the inner side, concave on the outer. It has the three cuneiform facets below, the inner antero-posterior. The inner is a flat bone with antero-posterior plane, and apex directed backwards, and considerable oblique facet for the second metatarsal. The mesocuneiform is much the smaller and brings the third metatarsus a short distance proximal to the fourth. The ectocuneiform is a little wider than deep. The metatarsals are three, and are rather slender. The two outer are equal in length, and the median but little wider proximally, the increased width being more obvious distally. They have no proximal grooves, and the outer has a low outer tuberosity. The facets of the second row of tarsals are  $\frac{1}{2}$   $\frac{1}{2}$   $\frac{1}{2}$ . The phalanges, including ungueal, are 3, 3, 3. The proximal ones are longer than wide and contracted at the ends; the

penultimate are still stouter in form. The ungues of the middle line are symmetrical and broad, with the margin a segment of an ovoid, and slight contraction at the neck. The proximal articulation is bounded by a fossa on each side, which is in its turn, isolated by the elongate process found in the tapir and in the horse. The margin is marked by radiating striae separated by grooves, of which the median is the most marked. The lateral ungues are contracted on the inner side, and only possess the proximal fossa and hook on the outer side. The median distal groove is well marked.

<i>Measurements.</i>		M.
Length of hind foot from heel.....		0.286
“ calcaneum.....		.083
“ cuboid facet of do. ....		.024
Depth calcaneum behind.....		.025
Width “ at astragalus....		.035
Greatest axial length of “ .....		.045
Width between trochlear crests do. ....		.022
Length neck do. outer side.....		.014
Width head do. ....		.030
“ navicular.....		.031
Length “ at middle.....		.010
“ cuboid.....		.022
Depth “ outside.....		.025
Length ectocuneiform in front.....		.013
Width “ “ .....		.019
“ mesocuneiform “ .....		.019
Length “ “ .....		.008
“ entocuneiform at side.....		.021
Depth “ “ .....		.015
Length of metatarsus II.....		.102
“ “ III.....		.107
Width “ II. proximally.....		.016
“ “ III. “ .....		.020
“ “ II. distally.... } within { .....		.016
“ “ III. “ .... } fossa. { .....		.025
Length median phalanges I.....		.025
Width “ “ distally.....		.015
Depth “ “ “ .....		.009
Length “ “ II.....		.015
“ “ “ unguis.....		.029
Width of articular facet do.....		.014
“ neck of do.....		.021
“ greatest expanse do.....		.029
Length phalanges of metatarsal II.....		.060
“ unguis “ “ .....		.028
Width “ (greatest).....		.018
Length metarsus and phalanges IV.....		.158

*Restoration.* The following dimensions may be relied on as a basis for a restoration of this species :

		M.
Length	head.....	0.220
	vertebral column less tail.....	1.063
	equal 42.1 inches.....	1.283
Height	of neural spines exposed.....	.035
	of scapula.....	.215
	of fore leg.....	.697
	Total 31.05 inclusive.....	.947
Height	of hind leg.....	.770
	of elevation of ilium.....	.135
	Total 29.7 inches.....	.905
Depth of body at middle manubrium.....		.255
“ “ at 15th rib.....		.250

Allowance being made for the obliquity of the humerus, scapula, femur and ilium, the elevation in life was,

	M.
At the withers (26.6 inch).....	.872
“ rump.....	.762

The size of this species was then that of a large sheep.

*Comparison of the skeleton with that of Tapirus roulini.* For the opportunity of making this comparison I am indebted to the Smithsonian Institution, which possesses a skeleton of the above species of tapir from Equador, presented by President Moreno.

*Cranium.* In addition to the generic characters mentioned at the commencement of this description, the *H. eximius* and *T. roulini*, differ as follows: in *H. eximius* there is (1) a high sagittal crest which is wanting in *T. roulini*, *T. malayanus*, and approximated in *T. terrestris*. (2) The crest of the squamosal part of the zygoma is continuous with the lateral occipital crest, which is not the case in existing tapirs.

*Vertebrae.* (1) The arterial canal of the atlas is not isolated in front as in *T. roulini*, but notches the basis of transverse process. (2) The axis is longer than in *T. roulini*. (3) The neural spines and especially the metapophyses of the posterior dorsal vertebrae are more elevated. (4) The ends of the centra of the lumbar are flatter, and more depressed. (5) The diapophyses are wider and longer and thinner and the penultimate articulates with the last by an angular process, which is not the case in *T. roulini*.

*Scapula.* (1) This bone is equal in size to that of a *T. roulini* of considerably greater general dimensions, and is hence relatively larger. (2) The spine is not angulate as in that species, has a longer base, and longer elevated margin. (3) The neck is more contracted and (4) the coracoid is not recurved as in *T. roulini*. (5) The sinus bounded below

by the latter is much shallower, and not bordered above by a recurved hook of the margin

*Humerus.* (1) It is relatively smaller in *H. eximius*. (2) The internal bicipital ridge of *T. roulini* is wanting. (3) The external condyle is much shorter, whence its border is nearer its trochlear rib. The *radius* has a narrower head (1), the external articular plane being shortened. (2) The shaft is wider with a more acute longitudinal lateral ridge medially, and more rounded distal end. The *ulna* is (1) absolutely nearly as long as in *T. roulini*, being thus relatively longer. (2) It has three weak longitudinal ridges on a convex outer face; in *T. roulini* the external face is divided by a very prominent longitudinal angle from the radial cotylus, which spreads distally, sending one angle to the upper and another to the lower base of the distal epiphysis.

*Carpus.* This part is (1) absolutely and relatively smaller than in *T. roulini*. (2) The pisiform is more cylindroid distally. (3) The scaphoid is more produced backwards on the inner side; the excavation of the inner side is more continued as a concavity of the outer side of the front. (3) The unciform has an acute tuberosity behind; in *T. roulini* it is short, vertical and obtuse. (4) The trapezoides has a shorter, wider, and more swollen external face. (5) The pisiform is small and convex instead of being larger and flat.

The *metacarpals* (1) are absolutely and relatively smaller. (2) The inner (II) has a more oblique phalangeal articulation, which is short above and with the keel prolonged upwards instead of being as in *T. roulini*, distal only.

The *pelvis* is distinguished by the much longer plate of the ilium, whose extremity constitutes the crest. (1) The crest is also shorter, and more anterior. In *T. roulini*, this plate does not so much exceed the sacral plate. (2) The pubes and ilia are not so horizontal, but meet at nearly a right angle, and (3) the ischiopubic common suture is considerably longer. (4) The obturator foramen is a more elongate oval.

The *femur* is very similar to that of *T. roulini*, being no smaller in relative size. (1) The great trochanter is wider fore and aft, and with margin more continued on the anterior aspect of the extremity of the shaft. (2) The great trochanter is nearer the middle of the length. (3) The condyle surfaces are continuous with the rotular, not isolated as in *T. roulini*. The latter also (4) lacks the two fossae on the outer margin of the external seen in *H. eximius*. (5) The rotular groove is also narrower in the latter and not so deeply excavated as in *T. roulini*.

The *tibia* is (1) reduced in size, and especially contracted distally; the relative widths of the ends are 6 cm : 3.5; in *T. roulini* 7.5 cm to 5. (2) The crest is more prominent and is deeply fissured by a groove, which is represented by a shallow concavity in *T. roulini*. The groove (3) external to this is deeper. (4) The posterior inner tuberosity of the distal end, is more median, hence the inner trochlear groove is further removed from the anterior inner malleolus, which has, therefore, a greater inner (not outer) extent.

The *tarsus* (1) is generally longer and narrower, except in the case of the cuboid bone (2) which is shorter than in *T. roulini*. (3) The astragalus has a narrower neck which therefore appears more on the inner side. (4) The facet for the cuboid is smaller. (5) The inner tuberosity of the head is more prominent. (6) The calcaneum is more slender, with larger cuboid facet, especially posteriorly. The *metatarsus* is absolutely nearly as long as in *T. roulini*, and therefore relatively longer and more slender. (2) The median (III) is nearly similar to the others in width; in the *T. roulini*, much larger than the lateral.

The *phalanges* of the first cross series are more contracted distally.

The more important differences between the skeletons of the two species in addition to those pointed out under the head of the genus, are those of the ulna, the scapula, the lumbar vertebrae, the ilium and the crest of the tibia. The scapula is more like that of *Tapirus terrestris*, while the ilium is approximated by that of *T. malayanus* among living species; its form leans towards the Equine series, and not to the *Puleootheroid*.

*Conclusion.* From the preceding it is evident that there lived in North America during the Eocene period, a type of *Tapiridae* only differing generically from that now existing in South America. Thus one form of the many peculiar and primitive ones of that time still persists in the Tropics and Southern hemisphere, which claims more ancient character than the Rhinocerus, Elephants, and other remains of Miocene time.

The affinities of *Cerculeptes* and *Nasua* to the types of the same period have been already indicated,\* and with the present case may be regarded as confirmatory of the proposition stating the early geologic state of the existing *Fauna Neotropica*.

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At the Stated Meeting of the Society, June 20, 1873, Professor Cope asked and obtained permission to withdraw his paper on the Primitive Types of the Orders of Mammalia Educabilia.

The current number of the Proceedings having been printed and ready for distribution, the register of the following pages is left as originally printed.

\* See on the Primitive types of the Mammalian Orders, 1871. See Origin of Genera, p. 99 and preced.